



NC DEPARTMENT OF  
**HEALTH AND  
HUMAN SERVICES**

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**Interim Report: Outbreak of Legionnaires' disease associated with the NC Mountain State Fair,  
September – October, 2019**

***October 18, 2019: This updates the interim report posted on October 10, 2019. This version reflects additional laboratory testing results and updated case counts.***

On September 23, 2019, the Buncombe County Department of Health and Human Services and Henderson County Health Department notified the North Carolina Division of Public Health (DPH) of an increase in reported Legionnaires' disease cases. By the end of the day, 14 confirmed and suspect cases had been identified. Early information gathered by local health departments and a Henderson County clinician indicated that most of these cases reported attending the NC Mountain State Fair, which ran from September 6<sup>th</sup>–15<sup>th</sup> at the Western North Carolina Agricultural Center (WNC Ag Center) in Fletcher, NC.

As of October 17, DPH has confirmed 141 cases of Legionnaires' disease (133) or Pontiac Fever (8) in residents of multiple states and NC counties who attended the 2019 NC Mountain State Fair (Figure 1); 94 (69%) persons were hospitalized and 4 persons died. DPH continues to work with local health departments to investigate; no cases have been identified with exposure to the WNC Ag Center since the fair ended.

**Environmental Investigation**

Beginning on September 23, DPH worked with the local public health staff and with the North Carolina Department of Agriculture and Consumer Services to develop a comprehensive list of aerosolized water sources to which fair attendees might have been exposed and to identify and address any possible sources of on-going exposure. Sources identified included hot tubs and diffusers that had been on display in the Davis Event Center and a cooling fan that had been located outside the Davis Event Center during the fair.

After establishing through interviews that the NC Mountain State Fair appeared to be the only common factor linking these cases, DPH [notified the public](#) on September 24; provided [guidance to clinicians](#) to consider Legionnaires' disease and laboratory testing; and encouraged anyone who had attended the fair and felt sick to seek care right away.

During September 25–27, DPH conducted a site visit to the WNC Ag Center with staff from the North Carolina Department of Agriculture and Consumer Services, the Buncombe County Department of Health and Human Services, and the Centers for Disease Control and Prevention (CDC) to identify any current sources of aerosolized water and collect environmental samples. Environmental samples were also collected from hot tubs that had been on display during the fair and from the cooling fan that had been present at the fair. All samples were submitted to CDC for testing.

One sample of water collected from the women's restroom in the Davis Event Center tested positive for *Legionella pneumophila*. All other samples collected from the WNC Ag Center (6 samples including the one positive), from the cooling fan (five samples), and from hot tubs that were on display during the fair (16 samples) tested negative for *Legionella*. It is important to note that environmental samples were not collected until between 12 and 22 days after the end of the Mountain State Fair and might not represent conditions during the fair. Preliminary testing indicates that *Legionella pneumophila* isolates found in the one positive environmental sample were genetically different from the *Legionella pneumophila* found in clinical samples from patients who were part of the outbreak; this testing is still on-going.

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## Epidemiologic Investigation

DPH conducted a case control study to identify the sources of exposure. The study included 60 people with confirmed Legionnaires' disease or Pontiac fever (cases) and 138 people who also attended the fair but did not get sick (controls). Study participants provided information through a survey (on-line or by phone) about the places they visited at the fair, including the amount of time they spent in particular areas.

Preliminary results from this study indicate that individuals who got sick were more likely to have visited the Davis Event Center; walked by or spent time at the hot tubs in the Davis Event Center; and attended during the latter half of the fair (September 11–15) (Table 1). Specifically, cases were 12 times more likely to have visited the Davis Event Center when compared with controls; 23 times more likely to report spending more than an hour in the Davis Event Center; more than 9 times more likely to report walking by or spending time by the hot tubs; and more than 36 times more likely to have attended the fair during the last five days (September 11–15).

**Table 1. Proportions and odds ratios for exposures at the NC Mountain State Fair Fletcher, NC September 2019**

Exposure	Cases, N=60 N (%)	Controls, N=138 N (%)	Odds Ratio <sup>1</sup> (95% Confidence Interval)
Visiting or working in the Davis Center	57 (93)	91 (66)	12.75 (3.5, 46.3)
Spending more than one hour in the Davis Center	27 (47)	23 (18)	23.4 (5.9, 92.2)
Walked by or spent time by the hot tubs	50 (86)	56 (41)	9.7 (4.2, 22.5)
Fair attendance from September 11 – 15 <sup>th</sup>	58 (97)	68 (49)	36.6 (8.4, 160.2)

<sup>1</sup>Odds ratios were frequency matched by age group.

## Interim Conclusions

The preliminary epidemiologic and environmental findings suggest that exposure to legionella bacteria occurred in the Davis Event Center, particularly during the last five days of the fair. Hot tubs are a well-established source of aerosolized water exposure and have been associated with previous Legionnaires' disease outbreaks nationally and internationally. People who visited the Davis Event Center, spent more than 1 hour in the building and attended the fair during the last five days were most likely to become ill. No significant sources of aerosolized water at the WNC Ag Center or other ongoing potential sources of exposure were identified. Continuing surveillance for Legionnaires' disease cases indicates that the outbreak has ended and the number of new Legionnaires' disease cases in North Carolina has returned to baseline. These results highlight the importance of caring for and maintaining equipment that can aerosolize water.

This report provides preliminary information from the investigation to date. Additional information will be provided when the environmental and epidemiologic investigations are complete.

This investigation has been conducted in collaboration with multiple local and state health departments, the North Carolina Department of Agriculture and Consumer Services, and with technical assistance from the Centers for Disease Control and Prevention. A special thanks to the Buncombe and Henderson County Health Departments for their early detection and response efforts.

## Figure 1.

